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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/099,981	03/19/2002	Toshiaki Aoai	Q69083	5513

23373 7590 03/16/2004

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EXAMINER	
ASHTON, ROSEMARY E	

ART UNIT	PAPER NUMBER
1752	

DATE MAILED: 03/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/099,981	AOAI ET AL.	
	Examiner	Art Unit	
	Rosemary E. Ashton	1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 October 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

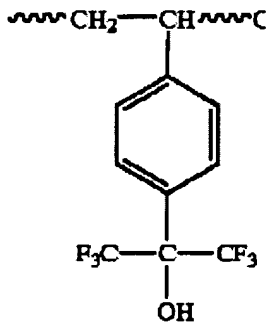
> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

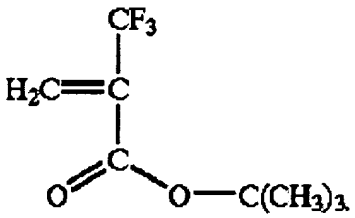
2. Claims 1,2,4-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Allen et al U.S. patent no. 6,610,456.

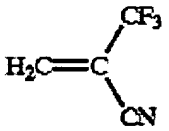
Allen teaches polymers for positive photoresist compositions comprising the polymer, a photoacid generator (PAG) and a nitrogen compound. The polymers have a monomer of 4-(hexafluoro-hydroxylisopropyl)styrene which is applicant's formula (I) when R4 is a hydrogen atom. The polymer in Example 9 has the three monomers shown below that meet the limitations of claims 1,2 and 4. The third monomer has formula (III) and the second monomer has formula IV where A2 is a single bond, R19-21 are methyl groups, R16 is a hydrogen atom and R17 is a haloalkyl (trimethylfluoro) group.

EXAMPLE 9

Terpolymer of 4-(Hexafluorohydroxyisopropyl)styrene, t-butyl 2-trifluoromethylacrylate, and .alpha.-(trifluoromethyl)acrylonitrile

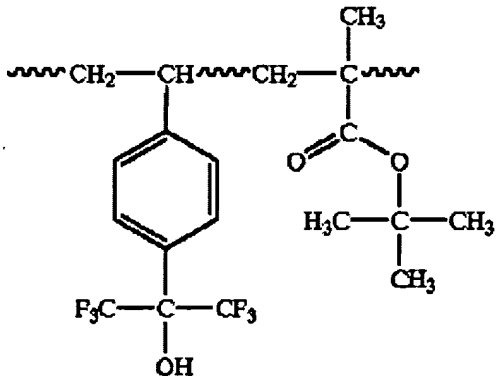






The photoresist composition comprises a nitrogen compound which acts as an acid diffusion controlling agent (col. 16, lines 35-51) as in claim 5 and an iodonium salt as a PAG which generates perfluorooctyl sulfonic acid as in claim 6 (col. 23, example 13). Other PAGs are N-camphorsulfonyl-oxynaphthalimide (an imide-N-sulfonate compound) (col. 13, lines 39-45) as in claim 7.

The polymer below has formula (I) in 10 % to 90 % which is in the range of 20-100% in claim 8 and 50 to 95 % in claim 10. The Mw of the polymer below having a trifluoromethyl acrylate, rather than a methacrylate, is 39,400 as shown in Example 7 (col. 21) as in claim 9.



The amount of PAG is 0.5-10 % by wt. as in claim 11 (col. 13, lines 60-66) and the composition may also have a surfactant (col. 16, lines 51-53) which one envisions to have a fluorine or silicon atoms because they are well known in the art as in claim 12. As shown in col. 2, lines 35-48, the composition is made for exposure at 157 nm as in claims 13 and 14.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 15,16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allen et al cited above.

While Allen teaches the claimed composition and exemplifies a patterning method using exposure at 248 nm it also teaches in col. 3 a method of patterning comprising coating the composition on a substrate, exposing to 248 nm or 157 nm, and developing as shown below.

> *One aspect of the invention also relates to the use of the resist composition in a lithography method. The process involves the steps of (a) coating a substrate (e.g., a ceramic, metal or semiconductor substrate) with a film comprising a radiation-sensitive acid generator and a copolymer as provided herein; (b) exposing the film selectively to a predetermined pattern of radiation to form a latent image therein; and (c) developing the image using a suitable developer composition. The radiation may be ultraviolet, electron beam or x-ray. Ultraviolet radiation is preferred, particularly deep ultraviolet radiation at 157 nm or 248 nm, or even extreme ultraviolet radiation at, for example, 13 nm. The pattern from the resist structure may then be transferred to the underlying substrate. Typically, the transfer is achieved by reactive ion etching or some other etching technique.*

Thus, while Allen does not exemplify exposure at 157 nm it would have been obvious to one of ordinary skill in the art to expose the composition taught in Allen at 157 nm with a reasonable expectation of obtaining a photoresist pattern because Allen teaches the composition is for exposure at deep UV, specifically 157 nm and 248 nm. As stated in the abstract below:

> *In a preferred embodiment, the polymers are substantially transparent to deep ultraviolet (DUV) radiation, i.e., radiation of a wavelength less than 250 nm, including 157 nm and 248 nm radiation, and are thus useful in DUV lithographic photoresist compositions.*

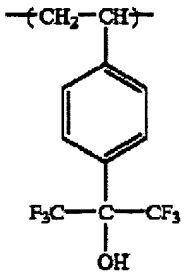
5. Claims 1,2,4-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Aoai et al U.S. patent application no. 2002/0061464.

Aoai teaches a positive photoresist composition for exposure at 157 nm meeting all the limitations claimed by applicant. The composition comprises a polymer, a PAG, a basic nitrogen compound, and a surfactant. As shown in Tables 1-3 the polymer have an Mw in the range claimed by applicant. In section 317 the photoresist composition is coated on a substrate, exposed to 157 nm and developed as in claims 15 and 16.

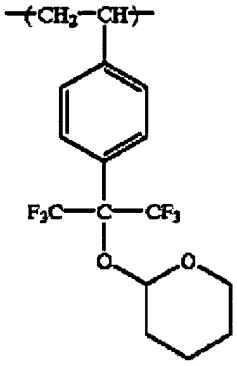
6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoai et al U.S. patent application no. 2002/0061464 cited above.

As shown in section 64 Aoai teaches a positive resist composition comprising a polymer having a monomer of one of the formulae IV-VII, wherein formula VII is applicant's formula I, and a monomer having on of formulae XV-XVII, wherein formula XV is the same as applicant's formula IV (maleic anhydride). Formula XVII is a monomer having a cyano group which meets the limitations of applicant's formula III wherein A1 is a single bond.

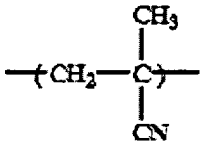
Specific examples of the resins are shown in Tables 1-5, e.g. resin 34 in Table 4 has monomers F-39/F-41/C-10 shown below.



F-39

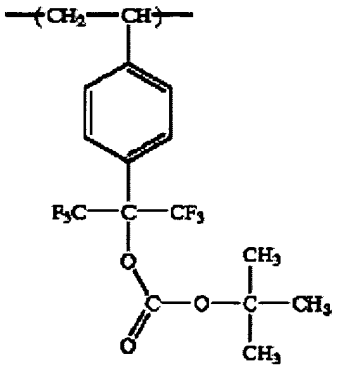


F-41

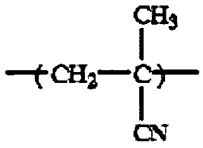


C-10

Another resin (resin 40) has formulae F-44/C-10 shown below wherein the first monomer has an alkoxycarbonyl group.



F-44



C-10

While Aoai does not exemplify a resin having formula I with maleic anhydride (formula III) it would have been obvious to one of ordinary skill in the art to use maleic anhydride in the polymer with formula I, rather than the cyano monomer, with a reasonable expectation of obtaining a photoresist composition for exposure to 157 nm because in section 77 Aoai teaches the monomers are equivalent alternatives in the resin.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rosemary E. Ashton whose telephone number is 571-272-1326. The examiner works a flexible work schedule and can normally be reached M-F between 10:00 am – 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached at 571-272-1385.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

rea
March 10, 2004

Rosemary E. Ashton
Primary Examiner
Art Unit 1752

ROSEMARY ASHTON
PRIMARY EXAMINER